

Application No. 09/589,299
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REMARKS

A. Independent claim 1 and claims dependent therefrom.

Claims 1-7, 9-11, 28-29, and 37 have been rejected under 35 U.S.C. § 103(a) over Amafuji et al. (US 6,292,158 B1) in view of Rallison et al. (US 5,949,583). Reconsideration of this rejection is respectfully requested, because Applicant's arguments have not been fully addressed, with specific deficiencies therein pointed out.

Amafuji has been cited for disclosing a compact display device 201 for transmitting an image to a user's eye. Amafuji discloses an off-axis optical system. Rallison has been cited for teaching an on-axis or axial optical system. The Examiner asserts that it would be obvious to combine the on-axis or axial system of Rallison with Amafuji.

In Applicant's previous response, Applicant submitted reasons why there is no teaching in Amafuji or Rallison as to how one of skill in the art would modify the Fig. 5 embodiment of Amafuji into an axial system. In any event, substantial reconstruction would be required to do so. In response to Applicant's arguments, the Examiner merely notes: "Rallison is used only to replace the off-axis eyepiece of Amafuji with an on-axis or axial system." (Office Action, page 20)

"The reasons for any adverse action or any objection or requirement will be stated in an Office action and such information or references will be given as may be useful in aiding the applicant . . . to judge the propriety of continuing the prosecution." 37 C.F.R. § 1.104(a)(2). "Where the applicant traverses any rejection, the examiner should, if he or she repeats

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the rejection, take note of the applicant's argument and answer the substance of it." MPEP § 707.07(f) (emphasis added). In the present case, however, the Examiner, however, has not addressed the substance of Applicant's response.

As set forth in the previous response, claim 1 recites a head-mountable support fixture comprising an elongated member having a first end and a second end. The projection system is attached at the first end of the elongated member of the support fixture and that the eyepiece assembly is attached to the second end of the elongated member of the support fixture.

Amafuji discloses a display system incorporating an off-axis optical system. The Examiner cites Rallison as disclosing an on-axis or axial system and asserts that it would be obvious to combine the on-axis or axial system of Rallison with Amafuji.

However, even if this asserted combination were made, it would not result in the presently claimed invention in which a projection system is attached at a first end of an elongated member of a support fixture and that an eyepiece assembly is attached to a second end of the elongated member of the support fixture. The Rallison axial system does not employ an elongated member having a projection system attached at one end and an eyepiece assembly attached at an opposite end.

More particularly, Rallison discloses an image generator 2 mounted in a visor arrangement to extend outwardly from the forehead area of the wearer. See Figs. 3 and 4. An optical path 6 from the image generator extends downwardly to a fold mirror 1 and outwardly to a reflective combiner 4, where it is then reflected back toward the eye. The image generator 2 is not attached at one end of an elongated member, and the optics (fold mirror 1 and

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WEINGARTEN, SCHURGIN,
GAGNEDIN & LEDOVICI LLP
TEL. (617) 542-2290
FAX. (617) 431-0313

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combiner 4) are not attached at an opposite end of an elongated member. Thus, Rallison does not disclose, teach, or suggest this recitation of claim 1.

Furthermore, Amafuji discloses an embodiment in Fig. 3 that is more like the visor arrangement of Rallison. Thus, if Rallison were to be combined with Amafuji for purposes of providing an axial system to minimize aberrations (the motivation suggested by the Examiner), the Rallison optical system would most likely be employed in the visor arrangement of Amafuji's Fig. 3. One of skill in the art would not try to rearrange the optical components of Rallison to place the image generator on one end of an elongated member and the optical components on the other end or to fit these components into the embodiment of Amafuji's Fig. 5, which is mounted on the side of the user's head. There is no teaching in Amafuji or Rallison as to how one of skill in the art would modify the Fig. 5 embodiment of Amafuji into an axial system. In any event, substantial reconstruction would be required to do so. Accordingly, claim 1 and the claims dependent therefrom are believed to be patentable over Amafuji in view of Rallison.

Claim 8 has been rejected under § 103(a) over Amafuji and Rallison and further in view of Taniguchi et al. (US 6,023,253). This claim is believed to be patentable for the reason set forth with respect to claim 1 and no further comment thereon is believed necessary at this time.

Claim 12 has been rejected under § 103(a) over Amafuji and Rallison and further in view of Ronzani et al. (US 5,844,656). This claim is believed to be patentable for the reason set forth with respect to claim 1 and no further comment thereon is believed necessary at this time.

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WRINGARTEN, SCHURGIN,
GARTEN & LEBOVICI LLP
TEL. (617) 542-2290
FAX (617) 542-6113

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B. Independent claim 13 and the claims dependent therefrom.

Claims 13, 15, 19, 28-29, and 40 have been rejected under § 103(a) over Amafuji and Rallison in view of Ronzani and further in view of Robertson et al. (US 6,034,653). Reconsideration of this rejection is respectfully requested.

Ronzani has been cited (in the rejection of dependent claim 12) for disclosing a HMD display in which the eyepiece assembly is "hollow and spherical and therefore curved." Ronzani, however, does not disclose a spherical eyepiece assembly. As is apparent from Figs. 1-9 of Ronzani (cited by the Examiner), Ronzani discloses an eyepiece or cell 3 that is housed in a cylindrical housing. Presumably there are optical elements within the eyepiece or cell 3. Ronzani, however, provides no disclosure, teaching, or suggestion as to the nature or configuration of any such optical elements within the cylindrical housing. Accordingly, Ronzani does not disclose, teach, or suggest a spherical, hollow eyepiece housing, as presently claimed.

Robertson is cited for disclosing a pod 330 that can be made of a display 332 and transparent window 335. The Examiner asserts that "if one side of the pod has a transparent window, it would be obvious that the pod can be made to be entirely of a transparent material or half or to what is desired." (Office Action, page 7)

Robertson does not disclose, teach, or suggest a transparent housing. The window 335 of Robertson is not a housing. There is no indication that the housing in Robertson could be transparent, and there is no apparent basis in the prior art of record for the Examiner's assertion that a housing could be made of a transparent material merely because there is a window in that housing.

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WEINGARTEN, SCHURCIN,
GAGNEBIN & LEBOVICI LLP
TEL. (617) 542-2290
FAX. (617) 451-0111

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Additionally, Robertson does not overcome the deficiencies of Ronzani, in that Robertson also does not disclose, teach, or suggest a spherical, hollow eyepiece housing as presently claimed. Accordingly, claim 13 and the claims dependent therefrom are believed to be patentable over Amafuji, Rallison, and Ronzani in view of Robertson.

Furthermore, the four different eyepiece assemblies disclosed in the four different references (Amafuji, Rallison, Ronzani, and Robertson) provide such a disparate variety of eyepiece assemblies, that it would not be obvious for one of skill in the art to come up with the presently claimed hollow, transparent, spherical housing, even relying on the motivations asserted by the Examiner. Thus, claim 13 and the claims dependent therefrom are believed to be patentable over Amafuji in view of Rallison, Ronzani, and Robertson.

Claim 14 has been rejected under § 103(a) over Amafuji, Rallison, Ronzani and Robertson and further in view of Taniguchi (US 6,023,253). This claim is believed to be patentable for the reason set forth with respect to claim 13 and no further comment thereon is believed necessary at this time.

Claims 16-18 and 20 have been rejected under § 103(a) over Amafuji, Rallison, Ronzani and Robertson and further in view of Fan et al. (US 5,815,126). This claim is believed to be patentable for the reason set forth with respect to claim 13 and no further comment thereon is believed necessary at this time.

C. Independent claim 21 and the claims dependent therefrom.

Claims 21-25, 28-29, and 43 have been rejected under § 103(a) over Amafuji and Rallison in view of Uehara et al. (US 6,243,208

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B1). Reconsideration and withdrawal of this rejection is respectfully requested for the following reasons.

Amafuji has been cited for disclosing a compact display device 201 for transmitting an image to a user's eye. Rallison has been cited for teaching an on-axis or axial optical system. Uehara has been cited for teaching an image system B1 that has a material of external surfaces and internal reflecting surfaces and in which light refracts as it enters and exits the system and reflects throughout the system. The Examiner asserts that it would have been obvious to combine the image display of Uehara with the image display of Amafuji and Rallison.

Uehara, however, relates to a complex optical system for use with devices such as a video camera, still video camera, copying machine and the like. (Col. 1, lines 8-12; col. 11, lines 27-34) In this optical system, light enters the optical element from one refracting surface and leaves from another refracting surface after it is repetitively reflected by a plurality of reflecting surfaces. (Col. 5, lines 37-44) In contrast, as recited in claim 21, light is refracted at the recited external surface as it enters the solid optical material via this surface, is reflected at the reflecting surface, and is refracted at the external surface as it exits the material. (See, for example, Fig. 7 of Applicant's specification.) Thus, even if combined with Amafuji and Rallison, Applicant's invention would not result.

Furthermore, it would not be obvious to combine Uehara with Amafuji and Rallison. As noted above, Uehara relates to a complex optical system for use with devices such as a video camera, still video camera, copying machine and the like, not to head-mounted

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display systems. There is no teaching in Uehara that the disclosed optical system could be used in a head-mounted display system.

Also, Amafuji discloses an off-axis optical system. Rallison is cited for modifying Amafuji to incorporate an on-axis or axial optical system. In contrast, the optical element of Uehara does not "have any symmetrical axis like an optical axis in a normal optical system." (Col. 7, lines 22-24) Uehara also states: "Since the optical system of the present invention is a decentered optical system, the individual surfaces that build the optical system do not have any common optical axis." (Col. 8, lines 42-44) Thus, one of skill in the art would not incorporate the complex optical system of Uehara into a head-mounted display, such as Amafuji as modified by Rallison. Further, it is not clear how the off-axis system of Amafuji, the axial system of Rallison, and the decentered system of Uehara would even be combined.

Accordingly, claim 21 and the claims dependent therefrom are believed to be patentable over Amafuji in view of Rallison and Uehara.

Claims 26-27 have been rejected under § 103(a) over Amafuji, Rallison and Uehara and further in view of Ronzani. These claims are believed to be patentable for the reasons set forth above with respect to claim 21, and no further comment thereon is believed necessary at this time.

Claims 30-32 have been rejected under § 103(a) over Amafuji, Rallison, Ronzani, Robertson, and Uehara in view of Lebby et al. (US 5,469,185). These claims are believed to be patentable for the reasons set forth above with respect to claims 1, 13, or 21, and no further comment thereon is believed necessary at this time.

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Claims 33-35 have been rejected under § 103(a) over Amafuji, Rallison, Ronzani, Robertson and Uehara in view of Fan. These claims are believed to be patentable for the reasons set forth above with respect to claims 1, 13, or 21, and no further comment thereon is believed necessary at this time.

Claim 36 has been rejected under § 103(a) over Amafuji and Rallison in view of Newman et al. (US 5,844,824). This claim is believed to be patentable for the reasons set forth above with respect to claim 1, and no further comment thereon is believed necessary at this time.

Claim 38 has been rejected under § 103(a) over Amafuji and Rallison in view of Horiuchi (US 6,304,234 B1). This claim is believed to be patentable for the reasons set forth above with respect to claim 1, and no further comment thereon is believed necessary at this time.

Claim 39 has been rejected under § 103(a) over Amafuji, Rallison, Ronzani and Robertson in view of Newman. This claim is believed to be patentable for the reasons set forth above with respect to claim 13, and no further comment thereon is believed necessary at this time.

Claim 41 has been rejected under § 103(a) over Amafuji, Rallison, Ronzani, and Robertson in view of Horiuchi. This claim is believed to be patentable for the reasons set forth above with respect to claim 13, and no further comment thereon is believed necessary at this time.

Claim 42 has been rejected under § 103(a) over Amafuji, Rallison and Uehara in view of Newman. This claim is believed to be patentable for the reasons set forth above with respect to

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claim 21, and no further comment thereon is believed necessary at this time.

Claim 44 has been rejected under § 103(a) over Amafuji, Rallison, and Uehara in view of Horiuchi. This claim is believed to be patentable for the reasons set forth above with respect to claim 21, and no further comment thereon is believed necessary at this time.

In view of the above amendments and remarks, all claims are believed to be in condition for allowance, and reconsideration and indication thereof are respectfully requested. The Examiner is encouraged to telephone the undersigned attorney to discuss any matter that would expedite prosecution of the present application.

Respectfully submitted,

MARK B. SPTIZER

By: Beverly E. Hjorth
Beverly E. Hjorth
Registration No. 32,033
Attorney for Applicant

WEINGARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
Ten Post Office Square
Boston, MA 02109
Telephone: (617) 542-2290
Telecopier: (617) 451-0313

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